

Conference Abstract

Digitising Kew's Science Collections: Upscaling and Delivering at Pace

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Abstract

Digitisation at the Royal Botanic Gardens, Kew

The Royal Botanic Gardens, Kew (Kew) houses the largest and most diverse botanical and mycological collections in the world, with over 8.25 million objects collected over 200 years. The collection underpins and facilitates Kew's scientific research. However, it is not easily accessible to the wider scientific community. The Science Collections Digitisation Project, costing £29.3 million and including a £10 million contribution from the United Kingdom's Department for Environment, Food and Rural Affairs, aims to complete the digitisation of its herbarium and fungarium collection by 2026, of which 1.3 million specimens were digitised pre-project. This is with the objective to provide open access to Kew's renowned herbarium data to support research on global issues such as the climate crisis.

A hybrid approach to digitisation has been adopted and includes a contractor to digitise the standard, single-specimen sheets alongside an in-house team to digitise the more complex specimens. The in-house team focuses on parts of the collection that require additional work and specialist knowledge, this includes fungi specimens, new acquisitions, Orchidaceae and Arecaceae families, to name a few. The Arecaceae family contains oversized herbarium sheets and bulky material, whilst the Orchidaceae family comprises sheets that can have several specimens, collected at different times and from different locations. Throughout the collection, there are also specimens that do not fit the supplier's standard workflow; these are also re-directed to the in-house team. The

Digitisation Project is underpinned by methods established pre-project (2004–2022) during which time 1.3 million specimens were digitised. At Kew, a specimen is considered digitised when it has an image, together with its metadata and a transcription. This work is bookended by pre- and post-digitisation processes.

Challenges

As the collection has been digitised, institutional expertise has been required to ensure that each specimen is accurately represented online, in the image and the data. Examples of subjects of requiring specialist knowledge include taxonomic families, collectors and specimen preparation methods. Similarly, issues such as mould, pest presence and damaged specimens have been found throughout the collection and demonstrated a need for an herbarium conservator, a role that did not previously exist at Kew, to advise on specimen treatment and collection durability.

As expected, there have been logistical challenges that include scaling up from a core team of four to a project team of over 80 staff members and consequently the ongoing provision of appropriate training. Furthermore, the project has been carried out in-situ in buildings dating from 1877 to 2009, presenting challenges in maintaining image capture standards and determining camera locations. Finally, proximity to the collection was a key consideration when deciding a Digitisation Officer's working location and it was important to balance the projects objectives against the needs of existing Kew staff.

New workflows for the Arecaceae collection and the specimens rejected from the supplier's workflow were developed during the project. Workflow development must consider pre-digitisation preparation, quality assurance of the images and transcriptions in addition to post digitisation data management. Maintaining pace during workflow development was difficult and relied upon rapid decision making, experienced digitisation officers and evolving workflow documentation.

Benefits to the collection and research

A digital collection not only contributes to research, but also ensures the longevity of the physical collection by reducing the unnecessary handling of specimens and providing a timestamp of their condition at the time of capture. The transition to a digitised and freely accessible collection will allow visitors to navigate the collection remotely before, or instead of, handling the physical specimens.

Herbarium specimens inform phylogenetic research through physical sampling of the preserved plant material as well as their preserved morphological features, the latter of which can be interrogated using the specimen images. Creating a comprehensive digital collection serves as the basis for future data enhancement, making more efficient use of research time.

Fundamental to extinction risk assessments, herbarium specimens are evidence of a species' distribution and abundance throughout time (Canteiro et al. 2019). Unlocking

Kew's herbarium data through digitisation will accelerate such research around the world and contribute to globally shared challenges such as biodiversity loss and food security.

Keywords

herbarium, transcription, imaging, natural history collections, digitisation

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Conflicts of interest

The authors have declared that no competing interests exist.

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